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Monthly Review

THE BANK OF NOVA SCOTIA

The Need for Arctic Gas

In recent years it has become abundantly clear that Canada's supplies of readily accessible energy resources are declining rapidly. This point has been driven home by the growing concern over Canada's dwindling conventional oil reserves, and by the emergence of an oil trade payments deficit. Compared to the concern over the country's oil position, there has been much less public recognition of the dimensions of the serious natural gas shortage which will confront Canadians unless urgent attention is given to securing frontier supplies of gas. It is true that the prospects for proving up significant amounts of gas in Alberta and British Columbia have begun to show considerable improvement. Nevertheless, present indications are that it will be impossible to meet the country's on-going gas demands from these sources much beyond the mid-eighties even if consumption growth were to be moderated considerably and exports cut off.

The purpose of this REVIEW is to underline the need for Arctic gas. This need is both incontrovertible and urgent, notwithstanding optimistic forecasts of cutbacks in consumption growth, and of additions to gas reserves in conventional producing areas. The REVIEW does not address itself to the question of how Mackenzie Delta gas should be shipped to southern Canada. The economic and social costs and benefits of the various pipeline proposals, as well as the environmental considerations, are already receiving a thorough examination in the National Energy Board and Berger hearings. Nor does the REVIEW address itself to the possibility of securing frontier gas from the eastern Arctic or the Atlantic coast.

Supply from Conventional Areas

The supply of natural gas expected to become available from Alberta and British Columbia over the next few years has recently begun to improve. This is in marked contrast to the circumstances prevailing in 1972 and 1973, when the yearly additions to reserves fell below annual production for the first time. The earlier unfavourable trend had appeared because the low, long-term contractual prices for natural gas had stimulated consumption and discouraged exploration and development. Changing royalty and tax structures, together with some instances of political confrontation, added to industry uncertainty and accentuated the general reluctance to commit funds for development.

By the end of last year the picture was noticeably brighter. Domestic gas prices had been moved closer to the still-increasing price of Canadian oil, and the gas export price had been raised; taxation burdens were eased; and the political climate improved. Producers are now setting out to develop the shallow wells of southern Alberta and Saskatchewan where most of the new reserves have been found recently. Intensive exploratory drilling is also taking place in the foothills of Alberta and in British Columbia, and major new discoveries have been made at Rosevear (near Edson) and in the Willson Creek-Limestone Mountain region west of Red Deer.

Some Demand Determinants

Whether the new reserves of natural gas becoming available in Alberta are actually marketed in Canada during the next few years will depend not only upon the need already mentioned, but upon a list of complex inter-related factors that influence the level of effective demand—the price compared to that for alternative fuels, the longer-run availability of a gas supply, and the adequacy of pipeline facilities.

The concern about long-run security of supply may well retard investment in further gas-using facilities. This might occur if potential new gas consumers were to conclude that the benefits derived from the short-run security of this high-quality fuel were outweighed by the advantages of the longer-run availability of alternative sources of energy such as oil and coal.

Effective demand is also related to the adequacy of transportation facilities. Pipelines are capital-intensive and are usually not put in place until there is a long-run assurance of supply and demand at a level close to the capacity of the line. The existing facilities to transport gas from Alberta to central Canada have little spare capacity and it would appear that the lack of assurance of a long-term supply of natural gas from either Alberta or the Arctic is currently an imposing hurdle in any major expansion of these facilities. Unless this transportation investment is expanded, the growth of gas consumption in central Canada will soon be restrained by insufficient pipeline capacity.

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Needless to say, all projections of effective demand have a very precarious quality in the light of the uncertainties concerning need, price, security considerations and transportation facilities. Nevertheless, such projections are essential to an understanding of Canada's gas requirements. And the demand projections presented in this REVIEW indicate that total Canadian requirements of natural gas will shortly exceed the available supply from established areas even if no impediments are placed upon the movement of gas from Alberta by regulatory action or pipeline capacity. Apart from frontier estimates, the supply projections used in the REVIEW are those forecast by the National Energy Board (NEB) in its 1975 Report (which assumed that an effective demand would exist to spur on the appropriate exploration and development). Against these general considerations, it is useful to look first at some regional aspects of the demand and supply balance.

The B.C. Shortages

The British Columbia natural gas system, consisting of Westcoast Transmission Company's main pipeline network and its gathering lines connecting the Beaver River fields in northern B.C. with the Pointed Mountain field across the border in the Northwest Territories, is basically independent of the rest of Canada. Gathering lines also tap small quantities of natural gas for B.C. from border fields in northern Alberta. (The pipeline, which carries the gas being exported from Alberta by the Alberta and Southern Gas Company along the southern B.C. border and on into the United States via Kingsgate, is far removed from B.C.'s major trunk line.)

Shortages of natural gas first arose in British Columbia in the fall of 1973 when deliveries from the Beaver River and Pointed Mountain fields had to be reduced sharply because of unanticipated water intrusion into the producing wells—by an amount which on an annual basis would have been 73 bcf.* This curtailment of deliveries, representing about 15% of the province's gas supply, has continued and no immediate improvement is anticipated (see Chart 2). However, additional gathering capacity was added last year, and a new compressor station at Boundary Lake will increase the supply available from Alberta throughout 1976.

Much of the cut in gas deliveries during the last months of 1973 was at the expense of export obligations. As a result of the decline in supply, B.C.'s consumption of gas was cut by some 19% in 1974 through a reduction in the use of natural gas (in favour of oil) at the Burrard generating station near Vancouver (other consumption increased by over 3¾%). Thus the cut in exports could be eased a little, though for the year as a whole the exports ran 41 bcf below commitments. In the summer and fall of 1975, consumption at the generating station was increased and requirements for other uses expanded as well. Although this left overall provincial consumption for the year some 3.3% below the 1973 level, exports had to be cut another 26 bcf to 214 bcf, or a total of 24% below the contracted amounts. This represents a significant cutback; B.C. gas accounts for over 14% of the Pacific Northwest's total energy consumption. The export shortfall would have been greater except for short-term supply arrangements allowing the purchase and resale of small quantities of Alberta gas, since the transmission company satisfies its domestic contractual obligations before those with its export customers.

Although exploratory drilling in the province was at a low ebb for a number of years, last winter's drilling season was a particularly active one. Producers are optimistic that more gas will be discovered, and there is even some suggestion that increasing field prices may restore the economics of producing from the flooded Beaver River-Pointed Mountain fields. With this improvement in prospect, it may be that the decline in B.C.'s production, forecast in last year's NEB report for the years after 1978 (see Chart 2), can be postponed for a time. However, there would appear to be little room for any improvement in meeting export obligations. Nor will there be sufficient additional gas to satisfy increasing provincial demand, and the transmission company recognizes this through its policy of providing no additional gas to domestic customers in excess of the volumes now under contract.

The Alberta Surpluses

Alberta is, of course, Canada's major natural gas producing province. Apart from minor quantities supplied to B.C., Alberta produces large amounts of gas for its own use, and for shipment east to Saskatchewan, Manitoba, Ontario, Montreal and for export to the U.S. Pacific northwest and the midwest. These distant locations mean that a considerable quantity of Alberta's natural gas is also used as pipeline fuel.

The natural gas produced in Alberta is subject to provincial government control unless it is shipped outside the province. Accordingly, the province carefully regulates the gas withdrawal permits that are issued in order to ensure that Alberta's requirements are fully satisfied before gas is removed. Alberta's own consumption in turn is free to grow. The federal government, in consultation with Alberta, determines the price of gas at Toronto, and Alberta uses this price as the basis for calculating the wellhead price. Since the Toronto price is still less than the comparable price for oil, and the transportation costs for gas are high, natural gas is an attractively-priced fuel in Alberta.

The province's gas demand is projected to grow at an annual rate of over 10% in the 1975-1980 period. A big part of this growth is related to the new fertilizer and petrochemical complexes expected to come on stream within the next few years. After 1980, consumption growth is forecast to slow appreciably (see Chart 3)—mainly because Alberta expects future petrochemical plants to be oil- rather than gas-based, and because gas is already the dominant fuel in the residential market.

The regulations under which Alberta issues withdrawal permits provide ample scope for meeting the province's projected gas demand. Briefly, two conditions must be met before these permits are granted. Alberta's indicated needs (in effect, for a period of about 15 years*) must be provided for out of already-proven reserves over and above those fo which withdrawal permits are approved In addition, Alberta issues withdrawa permits only if the province's 30-yea projected needs are provided out of thes already-proven reserves plus those anticipated to be proven within the nex five years or so.*

Although Alberta does not issue ga

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*For easy comparison all figures on demand and supply will be spoken of on an annual basis in billions of cubic feet (bcf).

*The regulations do not set out the number years' reserves directly, but rather set out comp cated formulae which have yielded this time sp in recent calculations.

withdrawal permits which fail to comply with these regulatory procedures, not all the gas thus reserved for Alberta's needs is under contract by provincial distributors. In fact, some of the gas has been purchased by pipeline companies hoping eventually to withdraw some of it from the province. For example, one gas distributor holds permits to export large volumes of Alberta gas to California, and has also purchased gas supplies substantially in excess of this permissible export volume (see Chart 4). However, now that the price incentive to export gas has been eliminated, this build-up of excess shut-in reserves is expected to come to a halt. These excess reserves could, of course, be called upon to meet Alberta's own requirements—and perhaps to minimize the possibility of export cutbacks should Eastern Canada begin to experience gas shortages.

Requirements East of Alberta

Gas consumption east of Alberta grew at a steady annual rate of some 13% over the decade ending in 1974—a rate over three times as fast as the growth in overall energy consumption. However, the recent increases in the price relative to other fuels, and the anticipation that within a few years it will be priced at parity with oil in Toronto, may well slow his growth to a pace which is more in ine with that of overall energy conumption.* At the same time, the rate of growth of energy consumption in total will probably show some decline in reponse to efforts to improve the efficiency of energy use.

The only Alberta gas that can be used o meet current demand east of the province must come from the reserves named under TransCanada PipeLine's withdrawal permits. Not all of this gas is vailable for the domestic market since ome 274 bcf annually (that is, roughly ne-fifth of TransCanada's withdrawal ermit volume) is under export contract o the U.S. midwest (see Chart 4). Alhough the NEB has stated that reasonble domestic requirements must be iven priority over existing export commitments in keeping with the intent of he Act under which the export licenses were granted, the Government might well be hesitant to cut exports to meet all growth in domestic demand. But at the moment TransCanada does not have sufficient reserves to meet the expected growth in domestic demand east of Alberta for more than two or three years, even if the Company were to stop exports completely by the end of this period. Recent approval of the long-standing permit application to remove a further 1,400 bcf at a maximum annual rate of 163 bcf, has made the Company confident of maintaining total deliveries (including exports) at *existing* levels through 1977, but this allows for no growth in consumption in either 1976 or 1977.

In addition to the gas that TransCanada holds under withdrawal permits, there is still gas available in Alberta which is surplus to the province's forecast needs. There is also general anticipation that the high level of exploratory and development drilling now going on in the province will prove up reserves at a rate higher than allowed for in earlier regulatory decisions. In fact, by the end of 1975, TransCanada had purchased another trillion cubic feet of gas reserves for which it intends to seek a withdrawal permit later this year. While there could be a time-lag before this can be marketed—related to the development of new reserves and the provision of gathering lines and new processing capacity—this might be minimized by the purchase of surplus gas from other Alberta exporters whose reserves are located in already-producing areas. Nevertheless, there seems little likelihood that the new production in Alberta will do more than safeguard Alberta's growing consumption while allowing withdrawals from the province to be maintained at their present levels, or a little higher, until somewhere between 1980 and 1985. In other words, significant growth in domestic consumption outside Alberta could only come with the assurance of frontier gas or (for a time) with a reduction in exports.

Export Policy and Domestic Demand

In the face of domestic shortages one natural reaction is to conserve supplies by curbing exports. However, such action may not be appropriate even from a narrowly national point of view. If exports of natural gas were stopped immediately, domestic demand would not sustain full production at existing fields and processing plants, and this in turn would have a very discouraging effect on new private exploration and development. The NEB estimates that, as a result of such a policy, potential supply would fall short of domestic demand about two years *earlier* and at a level some 300 bcf *lower* than if exports continued. However, such considerations serve only to reinforce the basic political inappropriateness of totally and immediately stopping exports of natural gas to a country upon which we are substantially dependent for a very large volume of trade, generally, and for the coal to supply electric generators and steel mills in Ontario in particular. Domestic economic interests are obviously better served by meeting the already-authorized export demand, so far as possible. Of course abrogation of export contracts is questionable on legal, as well as ethical grounds, unless domestic growth is also restrained.

One thing certainly can be said. Export demand should not be encouraged by an export price lower than the comparable price for world oil. Even with the increases now scheduled over the next several months, gas at the beginning of 1977 will be selling for $1.94 per thousand cubic feet (mcf) at the U.S. border compared with the energy equivalent of $2.15-$2.25/mcf for oil. As long as the disparity persists, the price at which Canada exports its gas will be less than the equivalent price of the oil or coal which are needed to replace natural gas in Canada.

At home too, the movement of the price for natural gas up to a parity with the domestic crude price would help to encourage conservation (it is to be maintained at 85% of parity for another year). Together with the growing industrial awareness of possible gas shortages, a higher domestic price would encourage the substitution of alternative fuels in those markets for which natural gas has no distinct advantage.

It is clear that regional considerations have an important role to play in shaping Canada's gas export policy. In British Columbia exports have already been significantly reduced in order to maintain the distributor's domestic supply obligations. Additional questions arise. Should exports be cut further to meet growth in provincial demand? Even if it should be decided that only a propor-

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The slight drop in gas consumption in 1975 can e attributed primarily to the warmer-than-average winter weather and to the slowdown in ndustrial activity, particularly in the pulp and aper industry which is a large user of natural gas n northern Ontario.

tion of the new demand will be met at the expense of exports, how is demand growth to be regulated? Should increasing residential gas demands, for example, be permitted at the expense of current levels of industrial consumption? If so, would this have a significant impact upon capital investment?

Constraints on the consumption of gas east of Alberta may arise either through restrictions on the permissible volume of natural gas which can be withdrawn from Alberta, or through limited pipeline capacity. Because TransCanada does not foresee any sustained increase in natural gas supply from Alberta, it does not plan any major expansion of its trunk facilities. This being the case, any increase in the supply of gas moving to Ontario and Quebec would initially have to be at the expense of cutting back on carrying export gas through the Company's pipelines, and shortly thereafter, would involve some increase in the capacity of the eastern sections of the system. Similarly, if more gas were made available from Alberta, either through a reduction in the exports of Alberta & Southern Gas Company or through a negotiated easing of Alberta's regulations it would only be helpful if other supplies dropped below the trunk pipeline capacity. Thus, unless TransCanada's pipeline facilities are expanded, any increase in consumption east of Alberta will be mainly at the expense of that Company's exports and not exports in general.

Some Thoughts About Arctic Gas

There are few, if any, serious analysts who now question the emerging shortfall in natural gas supplies. In this respect, public opinion appears to be slow to recognize the urgency of the situation. Yet there already are signs of inadequate supplies. In Ontario, natural gas consumption dropped 2% last year. This reduction occurred primarily because of warm weather and the recession. But had the Canadian economy been stronger and the weather more normal, the gas would simply not have been available to meet reasonable expectations of requirements in the area east of Alberta.

As noted earlier, British Columbia's natural gas exports have been cut back sharply—by 1975, to 24% less than the volume of B.C.'s authorized export contracts—in order to fulfill provincial contracts. Even so, after a decade of demand growth at over 12% annually, the province's consumption in the two years from 1973 to 1975 actually declined by over 3%.

Neither TransCanada nor Westcoast are accepting requests for additional gas, although their utility customers in both Ontario and British Columbia have been expanding their residential markets. With the economic recovery now well underway, the need for Arctic gas to sustain industrial consumption and exports will become clearer and actual shortages in domestic supply can be anticipated—perhaps as early as the coming winter—in the form of cutbacks in interruptible industrial supply.

As already indicated, there is a need for new sources of natural gas to meet any growth in Canadian natural gas consumption—however modest the growth may become in response to conservation measures and improvements in energy efficiency. It is also important to recognize that any replacement of gas by oil or coal will be at the expense of Canada's balance of payments since the country is no longer self-sufficient in oil and is not yet self-sufficient in coal. Any replacement by oil will also be at the expense of security of energy supply.

Understandably, until a decision is made on whether a pipeline is to be built from the Mackenzie Delta, energy planning will be hamstrung in both the private and public sectors. If a pipeline is not approved and no Arctic gas is forthcoming, major adjustments would eventually have to take place in Canadian energy consumption patterns, and it is not clear that such adjustments could be made smoothly even if adequately foreseen. TransCanada's facilities would not be expanded and, no matter what short run expedients might be attempted, eventually the supply of gas from Alberta would be insufficient to keep the line operating at even its present capacity. Other fuels would have to begin replacing natural gas in some uses in British Columbia and east of Alberta; Ontario and British Columbia in particular would have to live with the uncertainty of a growing dependence upon imported oil, and decisions would be needed in terms of the allocation of the declining supply of natural gas. For example, should specialized needs such as fertilizer production and the direct reduction of iron ore take precedence over heating requirements?

If, however, a pipeline is approved—and on the basis of evidence now available, the need for such a line is very clear indeed—a quite different series of developments would follow. Problems would still exist, particularly in the matching of demand and transportation facilities with the huge bulge in supply from the Arctic—a supply bulge which could be in the order of one-third of Canada's 1975 consumption (see Chart 1). Unless some kind of temporary export arrangement were devised, it would be difficult to cope with an almost instantaneous supply increase of this magnitude in the Canadian market alone.

Once such a supply is assured, however, other measures could be put in motion to ease the transition. Some relaxation of Alberta's protection scheme might be negotiated—to get a higher withdrawal rate over the next six or seven years in exchange for future guarantees of Arctic supply. Export cutbacks might be negotiated in exchange for guarantees to make up the deficiency later from Arctic gas, and TransCanada could begin to plan an appropriate expansion of its system. Since the proposed pipelines from the western Canadian Arctic pass in reasonably close proximity to the Westcoast trunk line in northeastern B.C., that province's supply could be supplemented by Arctic gas coming down partly through the B.C. system as well as through a new or expanded system in Alberta. An extension of the Quebec distribution system to coincide with frontier deliveries would also be appropriate.

The costs and benefits associated with shipping natural gas from the Mackenzie Delta to southern Canada are not easily compartmentalized in a regiona sense. It is true that many of the costs o not proceeding will impact on all Canadians, just as the benefits of approving line will be enjoyed by all. Yet, som regions may ultimately gain more tha others and the task facing policymaker is to ensure that the costs and benefits ar shared equitably. These tough decision will not be made easier by postpone ment; indeed they will be made mor difficult. To avoid incurring needles costs, decisions on the building of pipeline and on how the benefits Arctic gas are to be shared, should taken within the next year.

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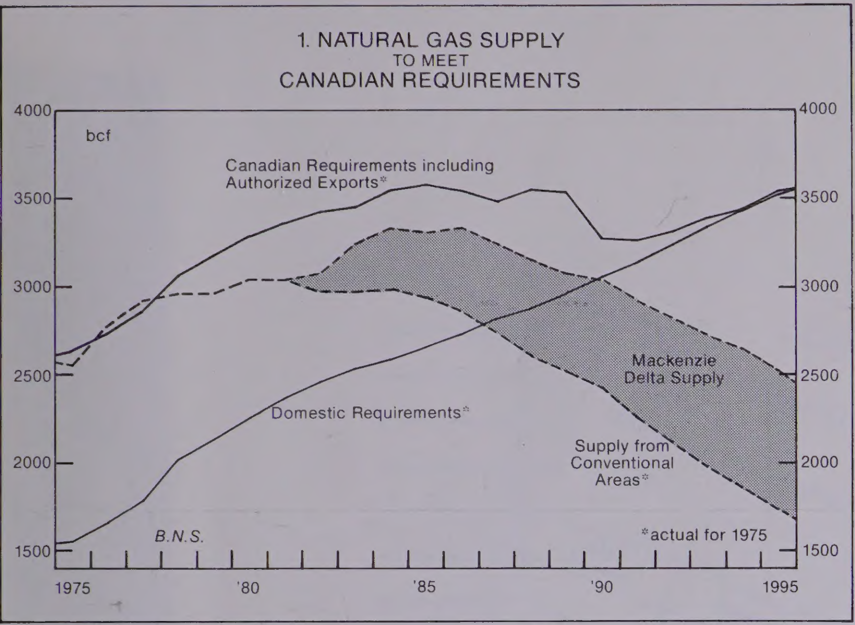
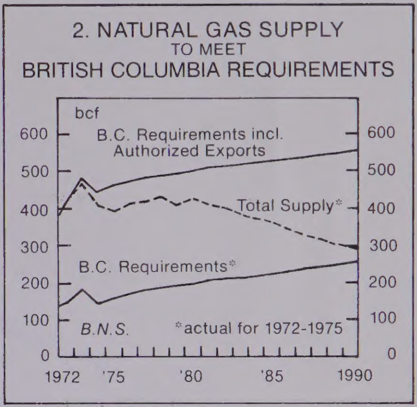


1. NATURAL GAS SUPPLY TO MEET CANADIAN REQUIREMENTS



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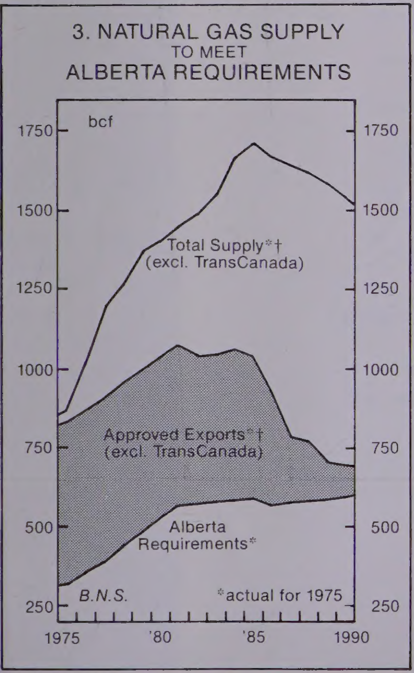
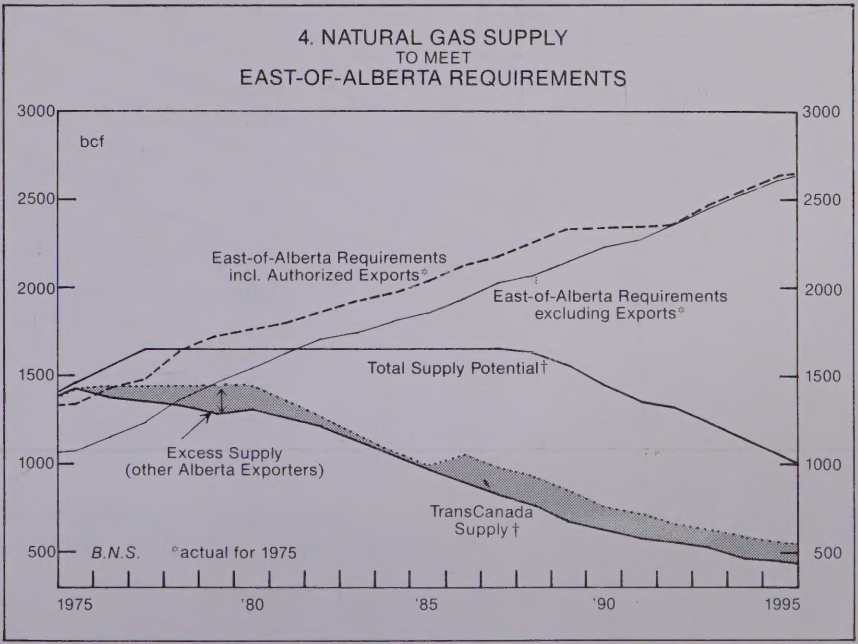


3. NATURAL GAS SUPPLY TO MEET ALBERTA REQUIREMENTS



4. NATURAL GAS SUPPLY TO MEET EAST-OF-ALBERTA REQUIREMENTS

†Since supplies of Alberta gas now under permit to TransCanada PipeLines for withdrawal eastward to meet domestic requirements and the Company's export contracts are shown in Chart 4 (and dealt with in the related text), these supplies are not included in Chart 3. TransCanada's pipeline begins at the Alberta border, and the company supplies no gas to meet Alberta's requirements.

†The supply potential shown, over and above that for which TransCanada already holds withdrawal permits, is the same as that shown in Chart 3 as surplus to Alberta's current needs. Some of this supply will be required to protect Alberta's 30-year consumption needs.

The small quantities of gas produced in Saskatchewan and Ontario are not distinguished from TransCanada's supply from Alberta, and are also included in the total supply.

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